



# An Evaluation of Hysterosalpingography Results in Infertile Females

## İnfertil Kadınlarda Histerosalpingografi Sonuçlarının Değerlendirilmesi

Abnormal Hysterosalpingography Findings

Alev Ozer, Onder Ercan, Bulent Kostu, Murat Bakacak, Hakan Kiran, Ferhat Aslan, Hilal Sakalli  
Department of Obstetrics and Gynecology, Sütçü İmam University, Kahramanmaraş, Turkey

### Özet

Amaç: İnfertil kadınlarda yapılan hysterosalpingografinin (HSG) tanısal bulgularının sunulması amaçlanmıştır. Gereç ve Yöntem: Ocak-Aralık 2015 tarihleri arasında üniversitede infertilite kliniğinde yapılan HSG kayıtları geriye dönük olarak değerlendirilmiştir. Anormal olarak değerlendirilen HSG sonuçlarındanki tanısal bulgular analiz edilmiştir. Bulgular: Çalışma süresi boyunca yapılmış olan 610 HSG işleminin kayıtları incelendi. Hastaların ortalama yaşı  $26.7 \pm 5.9$  olarak saptandı. Yapılan HSG işlemlerinin 145'inde (%23,8) en az bir anomalilik mevcuttu. Tubal oklüzyon en sık saptanan anomalilik olup toplam 77 (%12,6) olguda (56 (%9,1) olguda tek taraflı, 21 (%3,5) olguda çift taraflı) izlendi. Üç (%0,5) olguda uterin kavitede, üç (%0,5) olguda servikal kanalda dolum defekti saptandı. Toplam 51 (%8,4) olguda müllerian anomali (üç (%0,5) olguda uterus didelfis, yedi (%1,2) olguda uterus unikornis, 34 (%5,6) olguda bikornu/septat uterus, yedi (%1,2) olguda arkut uterus) saptandı. 17 (%2,8) olguda hidrosalpinks mevcuttu. Beş (%0,8) olguda peritoneal dağılım izlenmedi. Tartışma: Çalışmamızda anormal olarak değerlendirilen HSG oranı %23,8 olarak saptanmıştır. İnfertilite değerlendirmesinin temel unsurlarından biri olan HSG ucuz ve kolay uygulanabilir bir işlemidir. Gereksiz çekilen HSG sayısının azaltmak ve bu şekilde HSG'nin saptama oranını artırmak için HSG endikasyonları belirlenirken daha seçici davranışılmalıdır.

### Anahtar Kelimeler

Hysterosalpingografi; İnfertilite; Anormal HSG Oranı

### Abstract

**Aim:** To evaluate the diagnostic findings of hysterosalpingography (HSG) examinations of infertile females. **Material and Method:** A retrospective examination was made of all the records of HSG procedure applied in a university infertility clinic between January and December 2015. The diagnostic findings were analysed in those evaluated as abnormal HSG. **Results:** The records were examined of 610 HSG procedures applied during the study period. The mean age of patients was determined as  $26.7 \pm 5.9$  years. In 145 (23.8%) of the total HSG applications, at least 1 abnormality was determined. The most common abnormality was tubal occlusion, which was determined in a total of 77 (12.6%) patients; 56 unilateral (9.1%) and 21 bilateral (3.5%). In three (0.5%) cases, filling defect was determined in the uterine cavity, and in three (0.5%) cases in the cervical canal. Müllerian anomaly was determined in 51 (8.4%) patients, of which uterus didelfis was determined in three (0.5%) patients, unicornuate uterus in seven (1.2%), bicornuate uterus/septated uterus in 34 (5.6%) and arcuate uterus in seven (1.2%). Hydrosalpinx was determined in 17 (2.8%) patients and lack of peritoneal spill in five (0.8%) patients. **Discussion:** In the current study, HSG procedures were evaluated as abnormal at the rate of 23.8%. As HSG is inexpensive and easy to apply, it is one of the basic procedures in an infertility work-up. HSG indications should be defined more selectively to avoid the unnecessary application of HSG and thereby increase the detection rate.

### Keywords

Hysterosalpingography; Infertility; Rate of Abnormal HSG

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Corresponding Author: Alev Özer, Kahramanmaraş Sütçü İmam Üniversitesi Hastanesi, Kahramanmaraş, Türkiye.

T.: +90 3442803434 F.: +90 3443113005 E-Mail: serdarztb78@gmail.com

## Introduction

Infertility, defined as the inability to conceive after 12 months of regular unprotected sexual intercourse, affects approximately 15% of couples [1]. The male factor (45%), ovulation disorders (37%) and tubal damage (18%) are known to be the most common causes of infertility [2].

For imaging of the fallopian tubes, HSG remains the most widely used procedure, despite the development of new technologies [3].

The fallopian tubes on HSG are observed as tubular structures with fine lumen and regular borders, widening towards the bulbous region. Tubal abnormalities associated with congenital causes, endometriosis, infections, previous surgery and spasms can be observed on HSG [4].

With HSG, information can also be obtained related to the morphology of the uterus, the contours, cavity and even the width of the cervical canal [5]. Abnormalities of the uterine cavity account for 10% of the reasons for female subfertility [6]. Filling defects in the uterine cavity because of polyps or myoma or disruptions to the uterine cavity contours can be seen on HSG. Intrauterine adhesions can also be determined. HSG is used in the investigation of infertility, pelvic pain, congenital uterine anomalies and in the evaluation of tubal patency following tubal recanalisation surgery and in the diagnostic work-up of patients with recurrent pregnancy failure [5, 7].

The aim of this study was to present the results of HSG applied in our infertility clinic.

## Material And Method

This retrospective study was conducted at Kahramanmaraş Sütçü İmam University Hospital which is a tertiary level reference hospital. The records were examined of patients who presented at the infertility clinic between January and December 2015 to whom HSG was applied. Approval for the study was granted by the Local Ethics Committee.

HSG is applied in an outpatient setting at up to the 11th day of the menstrual cycle following the end of menses. In patients with bleeding, infection, malignancies of genital tract, pregnancy, allergy to contrast dye, recent uterine or tubal surgery in the last 6 months, HSG can not be applied. Routine antibiotic prophylaxis of tetracyclin was administered for 7 days following HSG. No analgesia was administered before the procedure. The patient was placed in the lithotomy position and a basal pelvis radiograph was taken to adjust the position. The vagina and external cervical os were cleaned with povidone iodine, then the cervix was held with a tenaculum.

A mean of 3-4 images were taken during HSG. Initially a conventional basal radiograph was taken prior to the administration of water soluble contrast dye to evaluate the positioning of the patient. Next, a cannula was entered into the cervical canal and 10-15 ml water-soluble contrast dye was slowly injected. Radiographs were taken under fluoroscopy during the filling of the uterine cavity and the fallopian tubes. In patients where the tubal passage could not be observed, to be sure whether or not there was tubal patency, instead of administration of a spasmolytic agent, an additional 10-20 ml contrast dye was administered. A final radiograph was taken to evaluate the peritoneal distribution of the contrast dye.

A normal examination was classified as normal uterine cavity with no structural abnormalities or filling defects and normal calibre fallopian tubes with free spillage of contrast into the peritoneal cavity. When contrast failed to outline one or both tubes and there was no peritoneal spillage, the patient was evaluated as having bilateral or unilateral tubal blockage and dilated tubes were classified as hydrosalpinx. Loculated spill was defined as the absence of free flow and dispersion of contrast into the peritoneum. Bicornuate and septated uterus were evaluated in the same group since the differential diagnosis was not possible by HSG alone.

## Results

The records were examined of 621 patients who underwent HSG examination between January and December 2015. As the cannula could not be placed in the cervical canal for the injection of contrast dye, 11 patients were excluded. The mean age of the 610 patients included in the study was  $26.7 \pm 5.9$  years. Of the 610 HSG examinations, 455 (76.2%) were evaluated as normal. In 145 (23.8%) patients at least 1 pathology was determined. Thus the rate of abnormal HSG procedures was determined as 23.8%.

The most commonly seen pathology was tubal occlusion in 77 patients (12.6%). Of these, there was unilateral occlusion in 56 (9.1%) patients (31 closed right tube, 25 closed left tube) and bilateral tube occlusion in 21 (3.5%) patients (Figure 1).

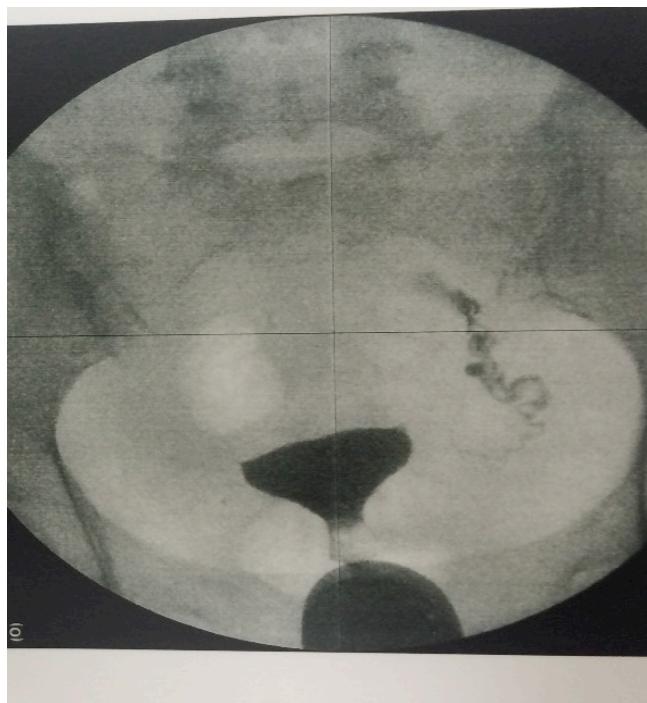


Figure 1. Unilateral tubal occlusion

Free peritoneal distribution was not observed in three (0.5%) patients bilaterally and in two patients (0.3%) unilaterally. Hydrosalpinx was determined in nine (1.5%) patients unilaterally and in eight patients (1.3%) bilaterally (Table 1).

Müllerian anomaly was determined in 51 (8.4%) patients. Of the müllerian anomalies, uterus didelphys was observed in three (0.5%) patients, arcuate uterus in seven patients (1.2%), bicornuate/septated uterus in 34 (5.6%) patients, and unicornuate

Table 1. Diagnostic findings on HSG

	Number of patients (%)
Tubal occlusion	77 (12.6%)
Unilateral	56 (9.1%)
Bilateral	21 (3.5%)
Müllerian anomaly	51(8.4%)
Uterus didelphys	3 (0.4%)
Unicornuate uterus	7 (1.2%)
Septate /Bicornuate uterus	34 (5.6%)
Arcuate uterus	7 (1.2%)
Filling defect in uterine cavity	3 (0.4%)
Filling defect in cervical canal	3 (0.4%)
Loculated spill	5 (0.8%)
Hydrosalpinx	17 (2.8%)
Unilateral	9 (1.5%)
Bilateral	8 (1.3%)

uterus in seven (1.2%) patients (Figure 2, 3). Filling defect was determined in the uterine cavity in three (0.5%) patients and in the cervical canal in three (0.4%) patients (Table 1).

Combined uterine and tubal pathologies were determined in 11 (1.8%) of the 610 HSG examinations. An allergic reaction to the HSG procedure, intravasation of the contrast dye, or infection following HSG was not determined. In 1 patient, the contrast dye was observed to have passed into the abdomen from a defect on a caesarean section scar (Figure 4). No problems developed in that patient following HSG.

## Discussion

The morphology of the uterine cavity, the lumina, and the patency of the fallopian tubes are demonstrated on HSG, which is relatively easy to apply as an outpatient procedure. As a minimally invasive method of evaluating tubal patency, it is used as a standard test in the workup of infertile couples.

In the European Society of Human Reproduction and Embryology (ESHRE) guidelines it is recommended that semen analy-

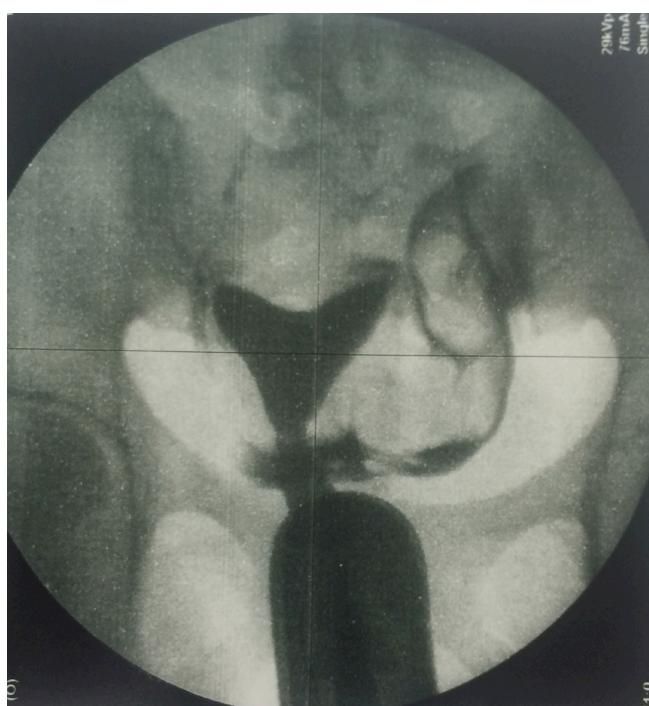


Figure 2. Arcuate uterus

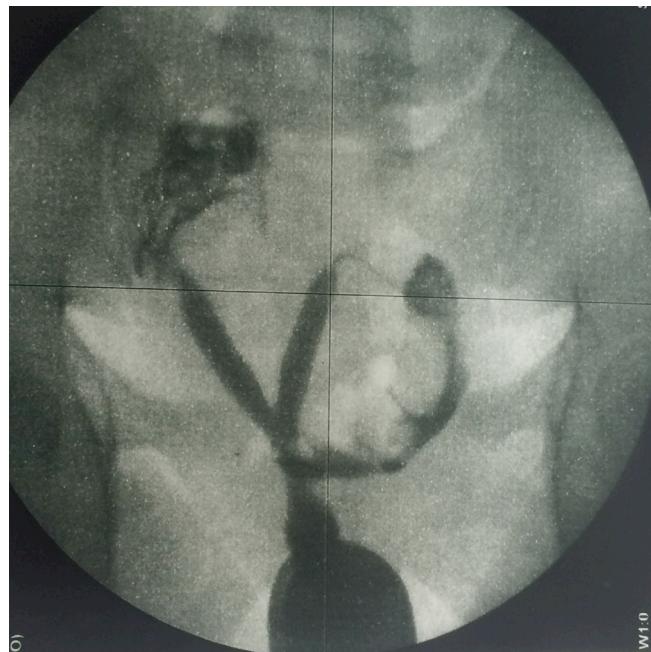


Figure 3. Septated uterus



Figure 4. Leakage of the contrast medium from a defect in casarean scar

sis and ovulation evaluation are applied before the evaluation of tubal patency in the investigation of the causes of infertility. According to the ESHRE guidelines, when tubal, uterine or pelvic pathologies are suspected or detected on transvaginal ultrasonography (TVUS), a first-line laparoscopy/hysteroscopy should be performed [4]. However, the ESHRE guidelines are not completely followed in many clinics and HSG is applied to all infertile females who present. This wide-ranging indication for HSG causes low detection rates. In a study by Schankath et al. [4], the detection rate of HSG was found to be 21% and thus it was reported that for every abnormal HSG to be determined, 4 unnecessary procedures were made. In the current study, HSG procedures were evaluated as abnormal at the rate of 23.8%. However, it was not possible to determine the detection rate of HSG due to lack of data about the results of the diagnostic procedures applied in patients with an abnormal HSG. Johnson et al. [8] reported that the improved patency of the fallopian

tube in HSG could be due to the therapeutic effect of the flushing during the examination. Schankath et al. [4] reported that pregnancy was achieved in 25 of 66 patients with an abnormal HSG without any tubal or uterine surgery and it was considered that HSG could have been a contributory factor.

Uterine smooth muscle encases the cornual portion of the fallopian tube and if there is a muscle spasm during HSG, one or both tubes may not fill. Tubal spasm cannot be distinguished from tubal occlusion on radiography. In a study by Schankath et al. [4], extremely high valency positivity of 39% was determined for proximal tubal occlusion. It has been emphasised that proximal tubal occlusions could be associated with tubal spasm and therefore the use of anti-spasmolytics and late radiographs is necessary. Similarly it has been reported by Simpson et al. [9] that tubal spasm could be overcome by gradual administration of the contrast medium or administration of a spasmolytic agent to relieve a spasm when it occurs. These measures could help to differentiate cornual spasm from true occlusion.

In the current study, unilateral tubal occlusion was determined in 9.1% patients and bilateral in 3.5%. A limitation of the current study is that the localisation of the occlusions in the tube (proximal/distal) was not stated in the records. Anti-spasmolytic was not used when applying HSG and it is thought that some of the tubal occlusions determined in the present study could have been due to tubal spasm.

Information about uterine size, filling defects and uterine anomalies is included in HSG reports in addition to crucial information about tubal patency and contours. In a retrospective study by Dalfo et al. [10] of 73 infertile patients, the sensitivity (81.2%) and specificity (80.4%) of HSG was determined to be high in the determination of uterine anomalies. In contrast, Acholonu et al. [11] reported HSG sensitivity as 58.2% in the determination of uterine abnormalities in a retrospective study of 149 patients who underwent hysteroscopy following HSG. Of 39 patients with a normal uterine cavity on hysteroscopy, 29 had been determined as abnormal on HSG and therefore the specificity was determined to be extremely low at 25.6%. In the same study, the sensitivity of sonohysterography was determined as 81.8% in the determination of uterine abnormalities. The authors concluded that in the evaluation of the uterine cavity, sonohysterography was more sensitive, more specific and more accurate than HSG [11]. In the current study, sonohysterography was applied to 3 patients determined with filling defect in the uterine cavity and in 1 patient, submucosal myoma was determined and in 2 patients, uterine polyps. Sonohysterography was also applied to 3 patients determined with filling defect in the cervical canal and all were determined with cervical polyps.

Intrauterine adhesions manifest as irregular filling defects, most often as linear filling defects originating from the uterine wall [9]. In the determination of intrauterine adhesions, Soares et al. [12] determined the sensitivity of HSG as 75%. Intrauterine adhesions were not determined in any patient of the current study. This could be due to the preference in our clinic for hysteroscopy rather than HSG for patients with suspected intrauterine adhesions.

Congenital uterus anomalies may develop in the 18th week of the pregnancy as the result of an incomplete junction of the

paramesonephric ducts (Muller ducts), or the non-absorption of the diaphragm, which is located between the ducts. The true prevalence of congenital abnormalities is not known, although prevalence rates have been reported varying from 0.16% -10% [13]. In a study of patients who had repeated abortus, the prevalence of congenital uterine anomalies on HSG was determined as 8%-10% [14]. The prevalence of Müllerian anomaly in infertile patients has been reported as approximately 1% [15]. In a systematic review by Chan et al. [16], it was reported that the prevalence of uterine anomaly in infertile patients was no higher than in an unselected population. Soares et al. [12] determined 44.4% sensitivity of HSG in the determination of uterine malformations. In the current study, the prevalence of Müllerian anomaly was determined as 8.4%. The reason that this rate is higher than that reported in literature could be for the following reasons: 1- the patient group included patients with habitual abortus and a history of infertility, 2- as our hospital is a reference centre, a significant proportion of the patients had been referred and therefore there was a higher possibility of Müllerian anomaly. The most common Müllerian anomaly determined was bicornuate/septated uterus. In previous studies of HSG applied to infertile patients, bicornuate uterus has been determined as the most common anomaly [17, 18]. Differentiation of uterus septus and bicornuate can not be made with HSG alone and therefore in HSG evaluation these 2 diagnoses could be interchangeable.

Distal occlusion associated with tubal inflammation could cause hydrosalpinx. On hysterosalpingography, the hydrosalpinx is seen as a dilated, convoluted tubular structure [3]. In the current study, hydrosalpinx was determined in 17 (2.8%) patients. Of these, laparoscopy was applied to 10 for whom the use of assisted reproductive technologies was planned. Using a bipolar cauterisation device in the laparoscopy, tubal blockage was made by cutting the connection between the uterus and the tube with hydrosalpinx.

Side-effects, such as pain, infection and intravasation of the contrast dye may be seen associated with HSG. In the current study no allergic reaction to the contrast dye or intravasation of the contrast dye was seen in any patient. No infection was determined in any patient following HSG. The contrast dye was observed to have passed into the abdomen from a defect in a caesarean section scar line in only 1 patient and that patient experienced no problems in the follow-up period after HSG. The routine administration of antibiotic prophylaxis was thought to have contributed to that.

In conclusion, as HSG is inexpensive and easy to apply, it is important in infertility work-up but it can be recommended that the number of unnecessary HSG applications should be reduced and this would increase the detection rate.

### Competing interests

The authors declare that they have no competing interests.

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